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THE UTILITY OF BDI-II IN ASSESSMENT OF PRE- AND POSTPARTUM DEPRESSION SYMPTOMS AND THEIR RELATION TO LABOR PAIN

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SUMMARY

Background: *It is argued that the total Beck Depression Inventory II (BDI-II) score likely overestimates depression in pregnant women given the overlap between depressive and somatic symptoms during pregnancy. The aim of this study was to explore the structure and the intensity of depression symptoms during pregnancy and two months postpartum. In populations with high incidence of somatic complaints (i.e. chronic pain sufferers) depression is also often related to higher pain intensity. Therefore, the relationships between depression symptoms and expected, perceived and recalled labor pain were also examined.*

Subjects and methods: *60 healthy primiparas enrolled the study. BDI-II as measure of depression was completed during the late stage of pregnancy and two months postpartum. Assessments of maximum and average labor pain were completed in three different time periods (before – expected labor pain, during/immediately after labor – perceived labor pain, and one month postpartum – recalled labor pain).*

Results: *Depression symptoms measured two months postpartum were significantly lower than the ones measured during the late stage of pregnancy ($t=8.377$, $df=49$, $p<0.01$). During the late stage of pregnancy, BDI-II items with highest mean scores were those measuring somatic symptoms of depression. Depression measured during the late stage of pregnancy correlated significantly with maximum labor pain expectancies ($r=0.41$, $p<0.01$).*

Conclusion: *The use of standardized questionnaires with a high rate of somatic items such as BDI-II may not be the best solution when screening for mood disorders in pregnant women. Levels of depression share a significant relationship with maximum labor pain expectancies only.*

Key words: *BDI-II – depression – labor - pain*

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INTRODUCTION

Women of childbearing age are at high risk for major depression (Burke et al. 1991) and the hormonal changes that occur during pregnancy often cause all kinds of somatic symptoms and bodily changes. These changes, like alterations in sleep, appetite/weight, energy and concentration can be stressful, especially for first time mothers. According to DSM-IV candidate symptoms for a depressive disorder also include disruptions in sleep, changes in appetite or weight, fatigue, psychomotor retardation and difficulty concentrating. The overlap between these symptoms and somatic symptoms during pregnancy renders it difficult to make a diagnosis of depression in pregnant women (Yonkers et al. 2009).

It's important to evaluate the true intensity of depression during pregnancy not only because of the impact it may have on the postpartum period, but because it has also been found to be associated with higher levels of pain intensity and is a potent risk factor for disability (Linton & Bergbom 2011, Mohr et al. 2010). Factors such as selective attention to mood-congruent information or increased accessibility of mood-congruent memories, may account for the relation between depression and pessimistic thinking (Lewinsohn et al. 1982, Ingram 1984). These factors may contribute not only to increased actual pain, but also to exaggerated pain expectancies. Raselli and Broderick (2007) found that for increased levels of baseline depression and neuroticism, patients displayed a pattern of always judging recent pain as more severe than pain in the previous week following several weeks of symptom monitoring. Concerning pain expectancies, a relation between depression and pain expectancies has been observed in undergraduate students participating in experimental pain procedures (Sullivan et al. 1997). There is also research to show that depression is associated with expectancies for negative outcomes (e.g. expectancies of great pain) (for a review Haaga et al. 1991). As for recalled pain, Raselli and Broderick (2007) found that neuroticism and depression did not influence the accuracy of recalled chronic pain.

Concerning labor pain and depression, Eisenach et al. (2008) found that women with severe acute postpartum pain are at high risk of developing postpartum depression compared to those with mild postpartum pain. On the other hand, Goldstein Ferber et al. (2005) suggest that labor pain catastrophizing rather than labor pain intensity predicts postpartum maternal adjustments.

On the other hand, it's possible that in populations with high incidence of somatic complaints (i.e. pregnancy, rheumatoid arthritis) symptoms of depression as measured by BDI-II are overestimated (e.g., Kuan Pin et al. 2007, Klein & Essex 1995). Namely, it's possible that these symptoms are actually a manifestation of high levels of body vigilance, i.e. anxiety sensitivity that has been shown to be related to pain during labor (Curzik & Jokic-Begic 2011).

However, only a single research (Lang et al. 2005) explored the relationship between symptoms of depression during pregnancy and labor pain. In Lang et al.'s research (Lang et al. 2006) depression (as measured by BDI-II) shared no significant correlation with labor pain.

As mentioned previously, when discussing symptoms of depression and populations with high incidence of somatic complaints (i.e. pregnancy) the question that often arises is what exactly do we measure when administering inventories such as BDI-II? The Beck Depression Inventory II is widely used to document the prevalence of depressive symptomatology and it's known that several BDI-II items have a somatic content (sleep disturbance, fatigue, etc). Since pregnancy may have similar somatic effects, the significance of the total BDI score in this population is unclear. On one hand, clinicians may attribute symptoms to pregnancy rather than to a depressive disorder, on the other hand, the high incidence of somatic symptoms during pregnancy may lead to a false-positive diagnosis of depressive disorder (Yonkers et al. 2009). Kuan-Pin et al. (2007) suggest that the use of standardized questionnaires that include a great number of somatic items such as BDI-II in populations with high incidence of somatic complaints (e.g., pregnancy and postpartum; chronic low back pain) could lead to false positives in detecting depression. Some researches recommend elimination of questions assessing somatic and behavioral symptoms of pregnancy when diagnosing mood disorders in pregnancy or propose different BDI-II cut-off points for different trimesters (Klein & Essex 1995, Cox et al. 1987, Sugawara et al. 1999). On the other hand, assessing the true levels of somatic aspects of depression during pregnancy may also be of importance for a different reason. Namely, high levels of somatic depression disturbances may present a source of high distress in pregnant women. It's possible that women with more somatic complaints during pregnancy become more vigilant to physical sensations that may lead to catastrophical expectations regarding labor pain.

It seems that the intensity and structure of depressive symptoms during pregnancy and postpartum period measured by BDI-II is still relatively uninvestigated area. The aim of this research was to extend the knowledge regarding the structure and the intensity of symptoms of depression before and after labor measured by BDI-II. We hypothesized that of all BDI-II items, those measuring somatic symptoms will be most pronounced before labor, and will decrease in intensity two months postpartum. Additionally, since depression may have an impact on pain intensity, the relationship of symptoms of depression and expected, perceived and recalled labor pain were also investigated. We hypothesized that symptoms of depression will share a significant relation with labor pain expectancies.

SUBJECTS AND METHODS

This study was approved by the Zagreb Faculty of Humanities and Social Sciences' Institutional Review Board and by Osijek Clinical Hospital Centre's Ethics Committee. All women provided informed consent. The research was performed at Osijek Clinical Hospital Centre.

To participate, women had to be healthy primiparas, between 37 and 40 weeks of pregnancy, and carrying a single child. Of 60 women who enrolled in the study, 46 completed all three stages of the study and thus were included in this analysis. In the second stage of the study, 11 women were excluded from the study because of caesarean delivery and/or complications during labor. Three women did not show up at the control examination one month postpartum and were also excluded from the study.

Women were recruited during late prenatal examinations. They were briefly informed about the research by their gynaecologist at the end of their examination and were directed to a room where they were more completely informed about the research procedure by one of the investigators.

Once informed consent had been given, women completed Beck Depression Inventory Second Edition and provided estimates of expected average and maximum labor pain intensities on a scale from 1 to 10 (1=no pain, 10=unbearable pain). Demographic information about age, education, household income, marital status, and marriage/relationship satisfaction (on a scale from 1 to 10, with higher number indicating higher level of satisfaction) was also provided. Assessments of actual maximum labor pain were taken after the last part of active labor on a scale from 1 to 10 and by completing the short-form McGill Pain Questionnaire. Each of the 15 words (i.e. sharp, cutting, flashing) from the short-form McGill Pain Questionnaire had been read by the investigator, and were assessed on a scale from 0 to 3 (0=none, 1=mild, 2=moderate, 3=severe). Average labor pain was assessed immediately after labor on a scale from 1 to 10. Recalled labor pain was assessed one month postpartum after the first postnatal examination by completing the short-form McGill Pain Questionnaire as a measure of recalled maximum labor pain intensity, and providing estimates of maximum and average labor pain intensity on scales from 1 to 10. To prevent the possibility that women might become more alert to different types of pain during labor, the short-form McGill Questionnaire was not used to assess labor pain

expectancies. Finally, two months postpartum Beck Depression Inventory Second Edition was completed. Such timing was selected because it was expected that by this time the woman will recover from the labor both psychologically and physically. In this way we tried to avoid the physical symptoms of postpartum (i.e. fluctuations in appetite, sleep and fatigue) from reflecting in the BDI-II scores. We assumed that the BDI-II scores two months postpartum would be an indicator of symptoms of depression rather than physiological postpartum changes.

In this research, the following questionnaires were used: Beck Depression Inventory Second Edition (BDI-II) and The Short-Form McGill Pain Questionnaire (MPQ-SF).

Beck Depression Inventory Second Edition (BDI-II) is a 21-item self-report inventory of symptoms of depression that has been used with both psychiatric and nonpsychiatric samples. Each item consists of four statements, scored 0–3, indicating increasing symptom severity; total scores range from 0 to 63. A cutoff score of 14 or above is typically used to identify patients with at least mild symptoms of depression (Thombs et al. 2008). It has excellent reliability and validity (Lang et al. 2005).

The Short-Form McGill Pain Questionnaire (Melzack & Katz 2001) was used in the present research, which is the most commonly used measure of labor pain and provides information about both sensory and affective aspects of pain (Stockman & Altmaier 2001). Sensory aspects of pain refer to temporal, spatial, pressure and thermal properties of pain whereas affective aspects of pain refer to tension, fear, and autonomic properties of the pain experience (Melzack & Katz 2001).

Statistical analysis

The Statistical Package for the Social Sciences, version 12.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Descriptive statistics, Chi-square, T-test for dependent samples and Wicoxon's signed rank test were used to analyse the results. The level of statistical significance was set at $p<0.05$.

RESULTS

Demographic features of the study sample are presented in Table 1. Women with and without complete data from all three stages of the research did not differ in age ($t=1.662$; $p>0.05$), marital status ($\chi^2=0.352$; $p>0.05$), income ($\chi^2=3.6$; $p>0.05$), education ($\chi^2=5.916$; $p>0.05$) and depression ($t=0.934$; $p>0.05$).

An interesting trend has been observed when all BDI-II items were ranked according to their mean scores. All items measuring somatic symptoms like alterations in sleep, fatigue, lack of interest in sex, energy and alterations in appetite/weight had the most pronounced mean scores (Figure 1). These somatic symptoms, although to a lesser extent, were also most pronounced two months postpartum (Figure 1). We tested the difference in BDI-II items mean ranks before and two months postpartum with Wilcoxon's signed rank test (Table 2). Interestingly, all items referring to behavioral and somatic symptoms (except apetite) had significantly changed mean ranks, while the same could not be observed for many items representing cognitive symptoms (Table 2). Symptoms of depression measured before labor shared a significant correlation with those measured two months postpartum ($r=0.513$; $p<0.01$).

Table 1. Demographic features of the study sample

	M (SD)	Range	N
Age	26.18 (4.952)	17 - 40	60
Marriage satisfaction	9.46 (0.816)	7 - 10	59
	frequency	%	N
Education			60
Primary school	6	10.0	
High school	40	66.7	
Some college	4	6.7	
College graduate	10	16.7	
Household income (monthly)			60
<$1000	20	33.3	
$1000–$1500	24	40.0	
$1500 –$3000	14	23.3	
>$3 000	2	3.3	
Marital status			60
Single	1	1.7	
Married	54	90.0	
Living with partner	5	8.3	

M – mean, SD – standard deviation; N – total sample number

Table 2. Wicoxons Signed Rank Test for BDI-II items mean ranks before labor and two months postpartum

BDI-II items	Z (Sig.)	M1 (SD)	M2 (SD)
sadness	-2.53 (0.011)	0.15 (0.404)	0 (0.000)
pessimism	-2.82 (0.005)	0.15 (0.360)	0 (0.000)
failure	-3.21 (0.001)	0.23 (0.465)	0 (0.000)
pleasure	-3.64 (0.000)	0.30 (0.530)	0 (0.000)
guilt	-2.71 (0.007)	0.20 (0.480)	0 (0.000)
punishment	-1.73 (0.083)	0.05 (0.220)	0 (0.000)
self-dislike	-1.00 (0.317)	0.02 (0.129)	0.06 (0.240)
self-criticism	-3.62 (0.001)	0.05 (0.748)	0.06 (0.240)
suicide	-1.00 (0.317)	0.02 (0.129)	0 (0.000)
crying	-3.90 (0.000)	0.53 (0.769)	0 (0.000)
irritability	-4.48 (0.000)	0.60 (0.643)	0.10 (0.303)
loss of interest	-1.98 (0.048)	0.40 (0.643)	0.22 (0.418)
indecisiveness	-3.39 (0.001)	0.45 (0.675)	0.10 (0.303)
self-worth	-2.07 (0.039)	0.13 (0.430)	0 (0.000)
loss of energy	-3.64 (0.000)	0.78 (0.715)	0.42 (0.538)
sleep	-3.65 (0.000)	1.12 (0.783)	0.66 (0.479)
agitation	-4.42 (0.000)	0.57 (0.563)	0.06 (0.240)
appetite	-.655 (0.513)	0.70 (0.646)	0.74 (0.487)
concentration	-4.00 (0.000)	0.58 (0.645)	0.14 (0.351)
fatigue	-4.01 (0.000)	0.97 (0.663)	0.46 (0.613)
sexual interest	-4.84 (0.000)	0.85 (0.709)	0.26 (0.443)

M=mean; SD=standard deviation; 1/2=before/ two months after labor; N=46

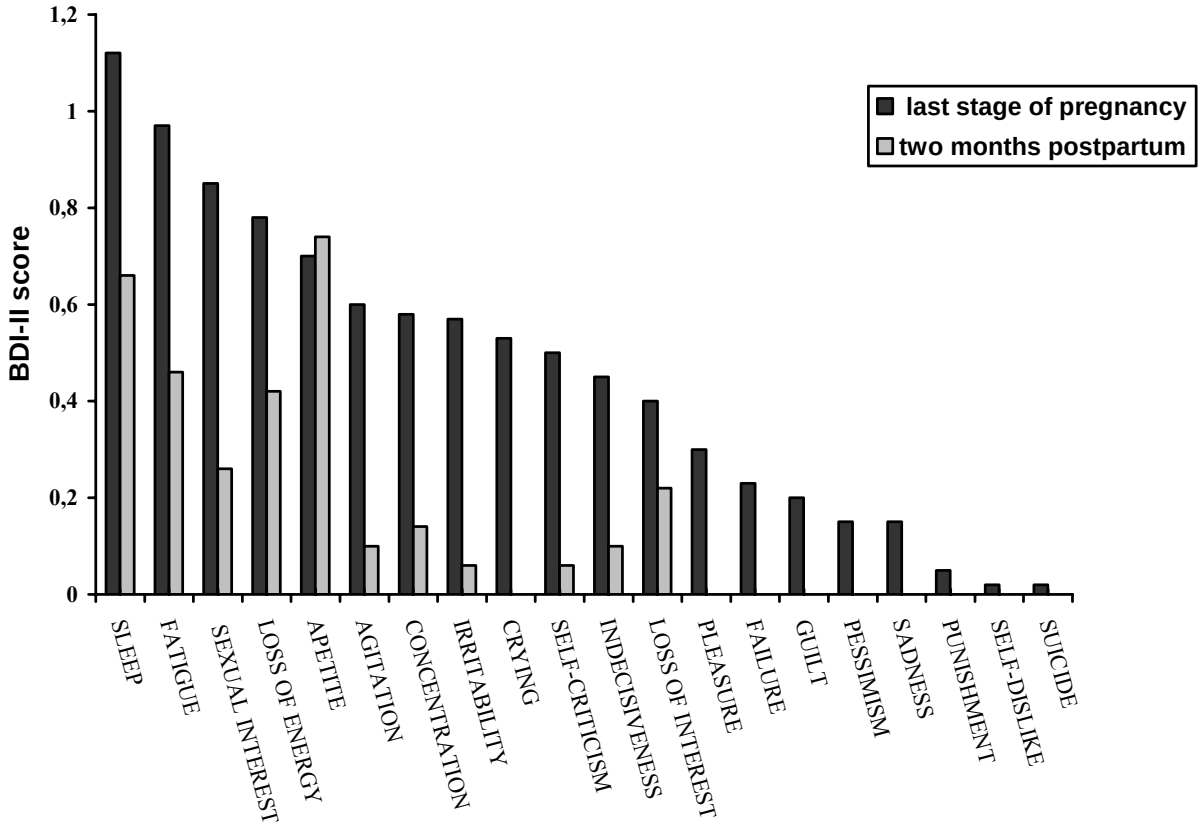

Figure 1. Pronunciation of somatic items, behavioral and affective items of BDI-II at the last stage of pregnancy and two months postpartum

Table 3. Descriptive measures of average and maximum labor pain intensities before, during/immediately and one month postpartum

	M	(SD)	Range
maximum labor pain - before labor (1)	7.73	1.955	8
average labor pain - before labor	5.93	2.050	9
maximum labor pain - during labor (2)	8.88	1.317	6
average labor pain - immediately after labor	6.49	2.484	10
MPQ-SF total - during labor	24.39	8.311	39
maximum labor pain - 1 month postpartum (3)	8.65	1.433	7
average labor pain - 1 month postpartum	7.22	2.043	9
MPQ-SF total - 1 month postpartum	18.28	8.358	36

N1=60; N2=49; N3=46

Table 4. Pearson's correlation coefficients between depression measured before and two months postpartum and labor pain assessments in three different time periods

	depression (BDI-II) before labor	depression (BDI-II) two months postpartum
maximum labor pain - before labor	0.425**	0.150
average labor pain - before labor	0.230	-0.156
maximum labor pain - during labor	0.162	0.193
average labor pain – immediately after labor	0.082	0.018
MPQ-SF total - during labor	-0.065	-0.152
maximum labor pain - 1 month postpartum	0.105	0.222
average labor pain - 1 month postpartum	0.171	-0.050
MPQ-SF total - 1 month postpartum	-0.019	-0.142

N1=60; N2=49; N3=46, ** p<.01; * p< .05

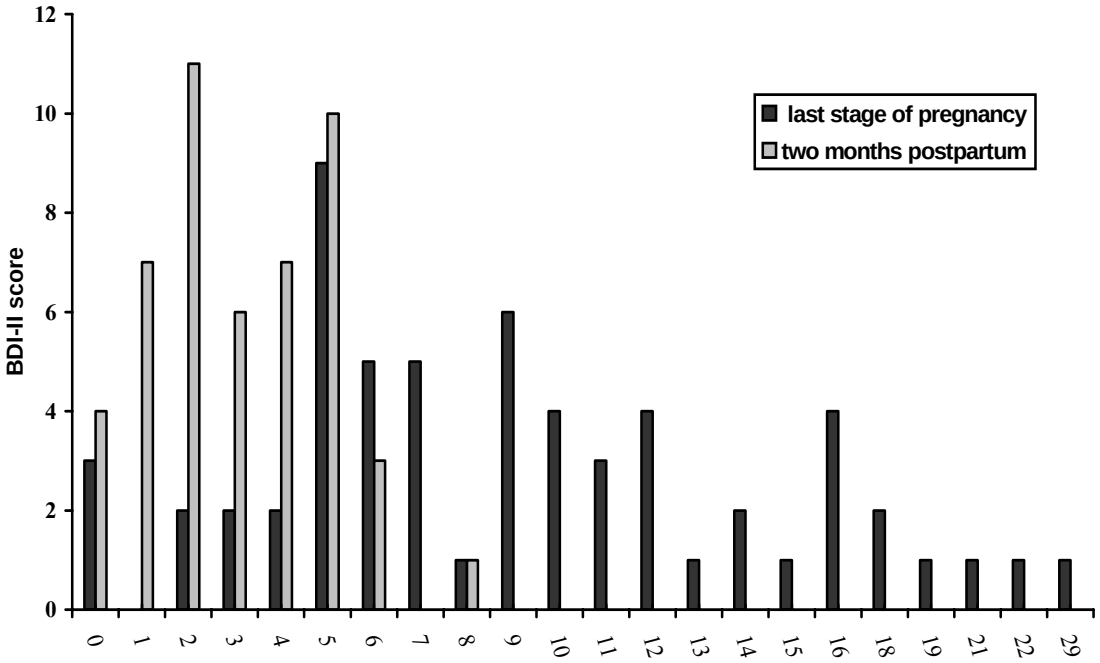

Figure 2. Distribution of BDI-II scores at the last stage of pregnancy and two months postpartum

Table 5. T-test scores for differences between depression symptoms before labor and two months postpartum

	M	SD	t	df	p	N
BDI-II before labor - total score	9.42	5.993	8.377	45	0.000	46
BDI-II - 2 months postpartum - total score	3.22	2.122				46

M – mean; SD – standard deviation; N – number of women; t – t-test score; df – degrees of freedom; p – level of significance

Maximum and average labour pain descriptives are provided in Table 3. To establish the relationship between labor pain assessments and levels of depression, Pearson's correlation coefficients were computed. As presented in Table 4, levels of depression correlated significantly with expectancies of maximum labor pain ($r=0.425$, $p<0.01$) only. Depression levels shared no significant relationship with perceived nor with recalled labor pain. Levels of depression measured two months postpartum shared no significant correlation with none of the measures of pain before, during or after labor (Table 4).

Concerning the differences between depression levels during the last stage of pregnancy and two months postpartum, t-test was computed (Table 5) and the distributions of BDI-II scores at the last stage of pregnancy and two months postpartum are presented in Figure 2. Levels of depression, measured by Beck Depression Inventory II two months postpartum, were significantly lower than those measured at the last stage of pregnancy ($t=8.377$, $df=49$, $p<0.01$).

DISCUSSION

This is one of the first studies to investigate the relationship between symptoms of depression (before and two months postpartum) and labor pain from three different time periods (before, during and one month postpartum).

The first important finding of this research was that depression symptoms measured by BDI-II at the last stage of labor were significantly higher than those measured two months postpartum. The highest individual BDI-II score at the last stage of labor was 29, where 10 was the highest BDI-II individual score two months postpartum. Moreover, we noted that BDI-II items that refer to typical somatic symptoms of pregnancy had the most pronounced mean scores. The question that arises from these findings is what does BDI-II measure in case of pregnancy? In Bennet et al.'s research estimated rates of postpartum depression based on the BDI were significantly higher than those found by structured interviews (Bennet et al. 2004). These authors argued that the total score likely overestimates depression given that the somatic items, which may be due to state of pregnancy, are most highly endorsed.

Yonkers et al. (2009) propose that Edinburgh Postnatal Depression Scale (EPDS) may be a more adequate measure of prenatal and postpartum depression than BDI-II. Although EPDS asks about sleep, it does not rely on other somatic or behavioral symptoms to identify women at risk for a unipolar mood disorder. This may lessen confounding by somatic and behavioral symptoms (Yonkers et al. 2009). Also, BDI has been reported to have validity poorer than that of the EPDS when tested in postpartum women (Eberhad-Gran et al. 2001, Harris et al. 1989, Teng et al. 2005, Affonso et al. 2000). Concerning EPDS, Kuan-Pin et al. (2007) even propose different optimal cutoff points to detect depression on different trimesters of pregnancy. They also state that EPDS cutoff points may vary across different cultures and populations. To our knowledge, the EPDS hasn't been validated against diagnostic interviews in Croatian language to detect depression during pregnancy.

The second finding of this study revealed that only expectancies of maximum labor pain share significant relationship with depression measured by BDI-II. This result is in accordance with the research findings of Sullivan et al. (2001). In their research, catastrophizing as a cognitive element of depression shared a significant relation with expectancies of pain in students prior to undergoing a pain inducing task. In case of pregnancy, such findings may be due to catastrophic thinking about labor pain, especially in first-time mothers who heard all kinds of stories about high pain intensities they should expect during labor. Catastrophizing is currently viewed as a multidimensional construct comprising elements of rumination ('I can't stop thinking about how much it will/may hurt'), magnification ('I'm afraid something serious may happen'), and helplessness (`There is nothing I can do to reduce the intensity of the pain') (Sullivan et al. 1995). Since "expecting the worst" is a form of thinking that characterizes depressive mood, it seems that in case of labor it can be translated in the expectancy of highest maximum labor pain intensities. Individuals who catastrophize may develop beliefs about the high degree of aversiveness associated with pain eliciting situations. It is becoming more apparent that both the context and the way a person thinks about the pain have the power to influence the experience of pain. It also seems that catastrophizing is used before expected pain sensations begin as a way of reducing anticipatory distress. (for a review Escot et al. 2009). However, it seems that such assessments are limited to expectancies only, and that encountering real labor pain intensities assures such expectancies weren't realistic.

These findings, however, imply that the application of BDI-II in the last trimester of pregnancy is useful for detecting pregnant women with intense autonomic disturbances (i.e. insomnia, fatigue, fluctuations in appetite). These women will expect intense labor pain that will probably lead to a distress and make the last weeks of pregnancy more difficult. Although our results don't allow drawing causal conclusions it's possible that the experience of insomnia, fatigue and other autonomic disturbances makes the woman more vigilant to physical sensations leading to catastrophical expectations regarding labor pain.

Studies on pre- and postnatal depression emphasize the importance of considering the entire perinatal period from pregnancy to postpartum, and not only postpartum, as depression and anxiety often begin in pregnancy (Buist et al. 2006, Evans et al. 2001, Johanson et al. 2000, Bjelanović et al. 2009). Postpartum depression, but even more so antepartum depression, are medical

conditions that have direct negative consequences on mother and child. An early detection of these conditions can help avoid or limit the use of pharmacological treatments with possible side effects.

The obstetrician should regularly test for depression from the very first moments of planning for a child. One of the implications of this study is that an adequate measure for detecting pre- and postnatal depression is needed in order to avoid false-positive diagnoses on one hand or ignoring the signs by simply attributing them to a "normal" state of pregnancy on the other hand.

There are several limitations to the present research. First, the investigator's presence could have been a distracter to pain perception, although pain assessments during labor were taken after the last part of active labor. Also, only one measure of depression has been administered. Future research should use other measures of depression that contain items regarding somatic symptoms for comparison and validation of this study's implications regarding physical vigilance and symptoms of depression in pregnancy.

CONCLUSION

All BDI-II items measuring somatic symptoms had the most pronounced mean scores prepartum. These somatic symptoms, although to a significantly lesser extent, were also most pronounced two months postpartum. Because of high incidence of somatic symptoms, BDI-II may not be the best solution for detecting depression in population of pregnant women. Maximum labor pain expectancies are significantly correlated with BDI-II score in prenatal period which seems to be the result of high incidence of somatic disturbances in this period and not depressive mood.

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Conflict of interest: None to declare.

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